Highly Dependable Computing and Communication Systems Research (HDCCSR)

Program Solicitation

DIRECTORATE FOR COMPUTER AND INFORMATION SCIENCE AND ENGINEERING
ADVANCED NETWORKING INFRASTRUCTURE AND RESEARCH
DIVISION OF COMPUTER-COMMUNICATIONS RESEARCH

NSF 02-106

FULL PROPOSAL DEADLINE(S): July 4, 2002

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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: Highly Dependable Computing and Communication Systems Research (HDCCSR)

Synopsis of Program: NSF and NASA will cooperate to fund projects that will promote the ability to design, test, implement, evolve, and certify highly dependable software-based systems. A significant feature of this solicitation is the use of a new NASA test-bed facility that will allow researchers to experimentally evaluate their research products on significant real hardware/software artifacts.

Proposals of up to $160,000 per year for up to 4 years are sought from eligible institutions, as described in the NSF Grant Proposal Guide. Proposal evaluation will be done by a standard NSF peer review process followed by a NASA evaluation for appropriateness and relevance to NASA objectives.

Because the solicitation seeks projects that combine the development of ideas and techniques with the execution of empirical studies and experimental validation using the NASA test-bed facility, funding will be provided through a combination of NSF grants and NASA cooperative agreements. Researchers are encouraged to submit NSF proposals describing a complete project with a full budget request for all proposed work for up to four years; NSF awards, however, will fully pay the first year only, up to $160,000 per award, based on the availability of funds, and then pay reduced amounts in years two through four. NASA funding, in the form of a cooperative agreement, would complete the total of up to $160,000 for each of the years two through four of the project but will be contingent on favorable evaluation of a separate proposal for test-bed usage, submitted to NASA during the first year of the NSF award period. The primary evaluation criteria for awarding NASA cooperative agreements will be the perceived effectiveness of the planned empirical evaluation using the NASA test-bed facilities, and the development of a working collaboration with other researchers on the NASA test-bed facilities.

The HDCCSR effort expects to make approximately 10 awards through NSF in Fiscal Year 2002 and 10 awards through NASA for the same projects in Fiscal Year 2003. The two agencies intend to fund additional new cycles of awards beginning in each of the following two fiscal years, FY 2003 and FY 2004, contingent on the availability of funds and the success of the FY 2002 competition.

Cognizant Program Officer(s):

- Frank D. Anger, Acting Deputy Division Director, CISE, C-CR, Room 1145, telephone: 703-292-8911, e-mail: fanger@nsf.gov.

- Helen Gill, Embedded and Hybrid Systems, Program Director, CISE, C-CR, Room 1145, telephone: 703-292-8910, e-mail: hgill@nsf.gov.
- Taieb Znati, Advanced Networking Research, Program Director, CISE, ANIR, Room 1175, telephone: 703-292-8949, e-mail: tznati@nsf.gov.
- Yuan-Chieh Chow, Operating Systems and Compilers, Program Director, CISE, C-CR, Room 1145, telephone: 703-292-8918, e-mail: ychow@nsf.gov.
- Carl Landwehr, Trusted Computing, Program Director, CISE, C-CR, Room 1145, telephone: 703-292-8936, e-mail: clandweh@nsf.gov.
- Spencer Rugaber, Software Engineering and Languages, Program Director, CISE, C-CR, Room 1145, telephone: 703-292-4542, e-mail: srugaber@nsf.gov.
- Michael Lowry, NASA, Ames Research Center, Room 236, Bldg 269, telephone: 650-604-3369, e-mail: mlowry@mail.arc.nasa.gov.

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.070 --- Computer and Information Science and Engineering

ELIGIBILITY INFORMATION

- **Organization Limit:** None
- **PI Eligibility Limit:** None
- **Limit on Number of Proposals:** While there is no restriction on the number of proposals submitted by any institution or investigator, the NSF Grant Proposal Guide (GPG I.E.2. and IV.B.) prohibits submitting the same proposal more than once to the same or different programs in NSF. This prohibition will also extend, in the case of this solicitation, to submission to all NASA programs as well. The complete text of the GPG is available electronically on the NSF Web Site at: http://www.nsf.gov/cgi-bin/getpub?gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

AWARD INFORMATION

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 10 in FY 2002
- **Anticipated Funding Amount:** $2,000,000 in FY 2002 based on the availability of funds.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Full Proposals:** Supplemental Preparation Guidelines
    - The program announcement/solicitation contains supplements to the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Deadline/Target Dates

- **Letters of Intent (*optional*):** None
- **Preliminary Proposals (*optional*):** None
- **Full Proposal Deadline Date(s):** July 4, 2002

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
    - Sharon Glivens, Program and Technology Specialist, CISE, C-CR, Room 1145, telephone: 703-292-8910, e-mail: sglivens@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Additional award conditions apply. Please see the program announcement/solicitation for further information.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

I. INTRODUCTION

The growing need for software-based systems that can be used with confidence (that the systems will behave as expected and will do no harm) mandates extraordinary efforts in software and systems research. Several programs at NSF and NASA already support research that addresses these issues, but none is focused, as is this solicitation, entirely on the goal of providing the means to create highly dependable software and networking-based systems. Another unique feature of this solicitation is the requirement for projects to use a new NASA test-bed facility to experimentally evaluate research products on significant real hardware/software artifacts. It is hoped that these features will attract novel and high quality research proposals, leading to the funding of projects that will have a significant and measurable effect on our ability to build the dependable systems the future requires.

The overall goal of this solicitation is to develop a scientific basis for measurable and predictable dependability in software-based computing and communication systems, and a scientific basis - comparable to those in physics-based engineering disciplines - for technologies or methodologies to improve dependability in these systems. If this is successful, then it is anticipated that government agencies as well as US industry will have a scientific basis for dependably using software-based systems, and for using technology interventions to achieve a predictable level of dependability. The key to this scientific feasibility is clearly defined attributes that can be objectively measured. Dependability attributes should encompass both aspects relevant to the dependability of deployed computing systems and attributes that can be measured before deployment: for example the complexity of interfaces between subsystems or the results of necessarily limited testing prior to deployment.

A successful scientific demonstration would show that objective, dependability attributes that are measurable before deployment can be used to predict measurable, dependability attributes of deployed systems; similarly, a successful technology or methodology demonstration would show that a technology or methodology has a measurable impact on the dependability of deployed systems, and this impact can be predicted before deployment. It is expected that most successful proposals will have four elements: fundamental research, prototype technology or methodology, dependability metrics, and an experimental approach.

II. PROGRAM DESCRIPTION

The purpose of this solicitation is to fund research that will lead to a significantly increased ability to create and field software-based systems of very high dependability at predictable and reasonable costs commensurate with the size and importance of the system. Proposals funded under this solicitation must meet four requirements. They must:

1. address fundamental research issues in dependable software-based computing and communication systems,

2. develop research products in the form of prototype tools or methodologies,

3. provide dependability attributes that are suitable for measuring the impact of the research products, and

4. include a plan for the empirical evaluation/validation of the proposed research products.

Technologies or methodologies of interest include, but are not limited to, the following:

o Verification and validation technologies and development methods for complex computing systems and network protocols,
o Development methodologies that are partially or wholly automated,
o Development methodologies that provide early validation of requirements and design, and that ensure correctness of implementation with respect to design specification,
o Fault-tolerant software and networking protocols,
o Architectures that ensure robust computing systems,
o Programming languages that preclude classes of software faults, and
o Development of new tools, methodologies and theory to further our basic understanding of computing and network dependability, manageability, reliability, and robustness.

NASA will provide test-bed facilities that are physically located at the Ames Research Park, near Mountain View, California. Selected proposals will have access to these test-bed facilities both by visiting the facilities, perhaps for extended durations, and through secure internet connections. The test-bed facilities include the following:

o Software artifacts of significant scale that represent mission-critical systems for both NASA and the IT industry. The initial set of artifacts will be selected by June of 2002, with additional artifacts acquired in future years. Current artifacts under consideration include networked distributed computing and communication for international space station payloads, and networked distributed computing and communication for next-generation air traffic control.

o The background domain knowledge needed to perform dependability experiments on the artifacts. The artifacts will be well documented, packaged, and configured in a manner that facilitates experimentation. In many cases, software researchers will have access to subject domain experts for the software artifacts.

o Hardware infrastructure (e.g., servers) capable of supporting test-bed experimentation at the Ames Research Park and for geographically distributed secure access to shared artifacts.

o Collaboration infrastructure to support information sharing, coordination, and awareness amongst different researchers on a test bed. This includes CVS or similar configuration management and versioning system, as well as other appropriate tools.

o A core scientific team that includes respected empirical investigators and researchers from a number of software disciplines. This scientific team will facilitate the use of the test-beds by researchers selected under this solicitation.

o Collaborators from NASA and the IT industry who will also be using the test-bed facilities for developing dependability technology.

Up-to-date information on the NASA test-beds can be found at http://www.hdcp.arc.nasa.gov .

Under this solicitation, proposals may be submitted with a duration of 4 years or less, and a total budget of $640,000 or less--about $160,000 per year. Part of each proposal must set forth plans for use of the NASA test bed, and part of the pre-award negotiations and post-award monitoring will be directed at assuring the effectiveness of this collaboration. Because the solicitation seeks projects that combine the development of ideas and techniques with the execution of empirical studies and experimental validation using the NASA test-bed facility, funding will be provided through a combination of NSF grants and NASA cooperative agreements running concurrently. Researchers are encouraged to submit NSF proposals describing a complete project with a full budget request for all proposed work for up to four years; NSF awards, however, will fully pay the first year only, up to $160,000, and then pay reduced amounts in years two through four. NASA funding, in the form of a cooperative agreement, would complete the total of up to $160,000 for each of the years two through four of the project. This NASA funding will be contingent on favorable evaluation of a separate proposal for test-bed usage, submitted to NASA after the first three months of performance on the NSF grant, but no later than the end of the first year of the NSF award period. The primary evaluation criteria for awarding NASA cooperative agreements will be the perceived effectiveness of the planned empirical evaluation using the NASA test-bed facilities, and the development of a working collaboration with other researchers on the NASA test-bed facilities. It is expected that the great majority of projects funded by NSF under this solicitation will receive a coordinated NASA cooperative agreement award that would run concurrently with years 2 through 4 of the NSF grant.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the Grant Proposal Guide are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

NSF anticipates spending $2,000,000 in FY 2002 for Standard or Continuing Grants up to a maximum of four years, pending the availability of funds. The grants will be structured under the assumption that the projects funded will also receive coordinated awards in the form of cooperative agreements from NASA. These NASA awards would begin in the second year of the NSF award (FY 2003) and continue for the remaining duration of the NSF award, usually FY 2003 through FY 2005. The combined total of the NSF grant and the NASA cooperative agreement awarded to a project will be for a maximum of $160,000 per year for up to 4 years.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Web Site at: http://www.nsf.gov/cgi-bin/getpub?gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

Supplemental Guidelines: Proposals should set forth a complete three- or four-year project, including planned experimental/empirical work on the new NASA Ames test-bed facility. (Up-to-date information on the NASA test-beds can be found at http://www.hdcp.arc.nasa.gov .) Follow-on proposals to NASA, as described in Section II, will be governed by the NASA Grants and Cooperative Agreement Handbook NPG 5800.1. The online handbook is available at http://ec.msfc.nasa.gov/hq/grcover.htm.

No letters of intent are required. Proposals should show "Computer-Communications Research" as the first and only NSF organizational unit in the Organizational Unit block of the proposal Cover Sheet.

Proposers are reminded to identify the program solicitation number (Not Specified) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost sharing is not required in proposals submitted under this Program Solicitation.

C. Deadline/Target Dates

Proposals must be submitted by the following date(s):

Full Proposals *by 5:00 PM local time*: July 4, 2002

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: http://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk

answers general technical questions related to the use of the FastLane system. Specific questions related to this Program Solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane website at: http://www.fastlane.nsf.gov.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The two merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgements.

What is the intellectual merit of the proposed activity?
How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?
How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education
One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities
Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria
In addition to the standard NSF review criteria, proposals will be judged by how well they:

1. address fundamental research issues in dependable software-based computing and communication systems,

2. develop research products in the form of prototype tools or methodologies,

3. provide dependability attributes that are suitable for measuring the impact of the research products, and

4. plan for the empirical evaluation/validation of the proposed research products utilizing the NASA Ames test-bed facility.

For the purposes of this solicitation, plans for utilization of the NASA test-bed facility can be general in nature; however, the plans for the empirical evaluation/validation of the proposed research products should be carefully thought out to result in scientifically credible results. Proposals will be judged on their plans for a full project of up to four years, even though much of that project will depend on qualifying for additional funding from NASA starting in the second year of the NSF award. Information on NASA objectives and the NASA Ames test bed can be found at http://www.hdcp.arc.nasa.gov .

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the identities of reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Mail and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation or the date of proposal receipt (whichever is later). The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at one's own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1)* or Federal Demonstration Partnership (FDP) Terms and Conditions;* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the

preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at http://www.nsf.gov/cgi-bin/getpub?gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at http://www.gpo.gov.

Special Award Conditions
Standard NSF award conditions apply to the NSF awards under this solicitation; however, if a project also receives a coordinated award from NASA, the NASA award will be governed by cooperative agreements with NASA following NASA guidelines found in the Grants and Cooperative Agreement Handbook NPG 5800.1. (The online handbook is available at http://ec.msfc.nasa.gov/hq/grcover.htm). In this case, the NSF and NASA awards support a single research effort, but investigators must understand that the budgets and their accounts are separate and must be managed and accounted for separately.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding Highly Dependable Computing and Communication Systems Research should be made to:

- Frank D. Anger, Acting Deputy Division Director, CISE, C-CR, Room 1145, telephone: 703-292-8911, e-mail: fanger@nsf.gov.

- Helen Gill, Embedded and Hybrid Systems, Program Director, CISE, C-CR, Room 1145, telephone: 703-292-8910, e-mail: hgill@nsf.gov.

- Taieb Znati, Advanced Networking Research, Program Director, CISE, ANIR, Room 1175, telephone: 703-292-8949, e-mail: tznati@nsf.gov.

- Yuan-Chieh Chow, Operating Systems and Compilers, Program Director, CISE, C-CR, Room 1145, telephone: 703-292-8918, e-mail: ychow@nsf.gov.

- Carl Landwehr, Trusted Computing, Program Director, CISE, C-CR, Room 1145, telephone: 703-292-8936, e-mail: clandweh@nsf.gov.

- Spencer Rugaber, Software Engineering and Languages, Program Director, CISE, C-CR, Room 1145, telephone: 703-292-4542, e-mail: srugaber@nsf.gov.

- Michael Lowry, NASA, Ames Research Center, Room 236, Bldg 269, telephone: 650-604-3369, e-mail: mlowry@mail.arc.nasa.gov.

For questions related to the use of FastLane, contact:

- Sharon Glivens, Program and Technology Specialist, CISE, C-CR, Room 1145, telephone: 703-292-8910, e-mail: sglivens@nsf.gov.

For questions related to NASA cooperative agreements or the NASA test-bed facility, contact Dr. Michael Lowry; for questions related to NSF procedures and policies, contact Dr. Frank Anger. For scientific guidance, contact the relevant disciplinary officer listed.

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at http://www.nsf.gov/cgi-bin/getpub?gp. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF E-Bulletin, which is updated daily on the NSF web site at http://www.nsf.gov/home/ebulletin, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's Custom News Service (http://www.nsf.gov/home/cns/start.htm) to be notified of new funding opportunities that become available.

There are a number of other programs in NSF that support closely related work on dependable software-based systems. Some of the most related, and the division in which they are located, are:

1. Advanced Networking Research (ANIR)
2. Embedded and Hybrid Systems (C-CR)
3. Next Generation Software (EIA)
4. Operating Systems and Compilers (C-CR)
5. Software Engineering and Languages (C-CR)
6. Trusted Computing (C-CR)

For more information, visit the respective divisions on the CISE homepage: http://www.nsf.gov/home/cise .

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Information Dissemination Branch, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

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